

Composites interfibres toughnesses associated with longitudinal and transverse directions to the fibres

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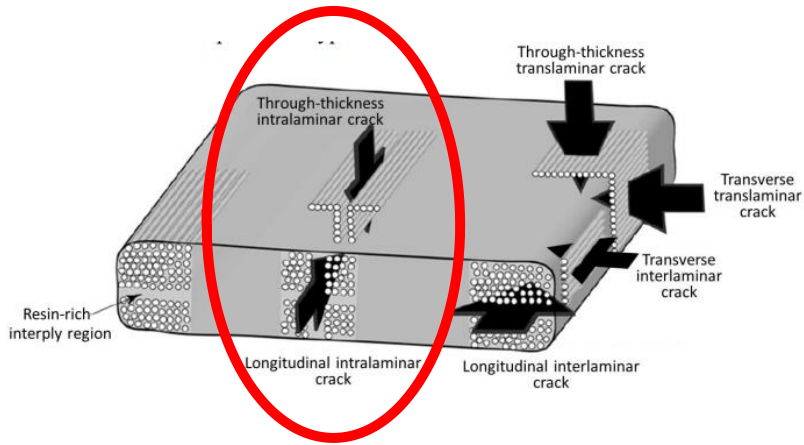
Summary

Motivation

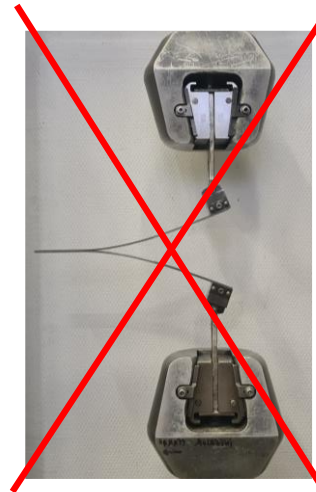
Same fracture toughness?

Which test?

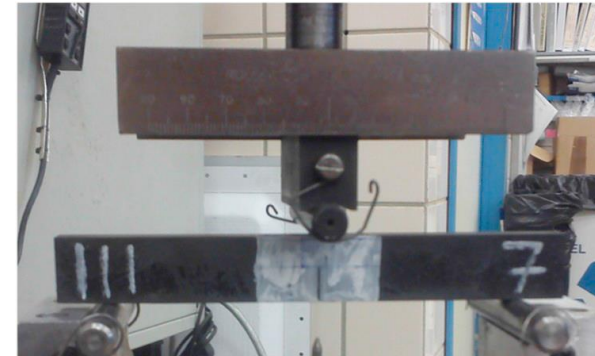
Motivation



DCB?



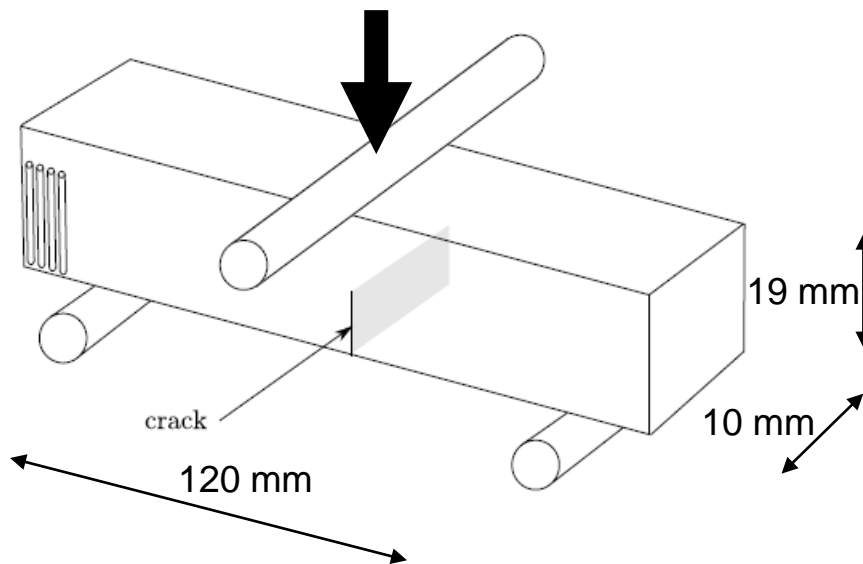
TPB



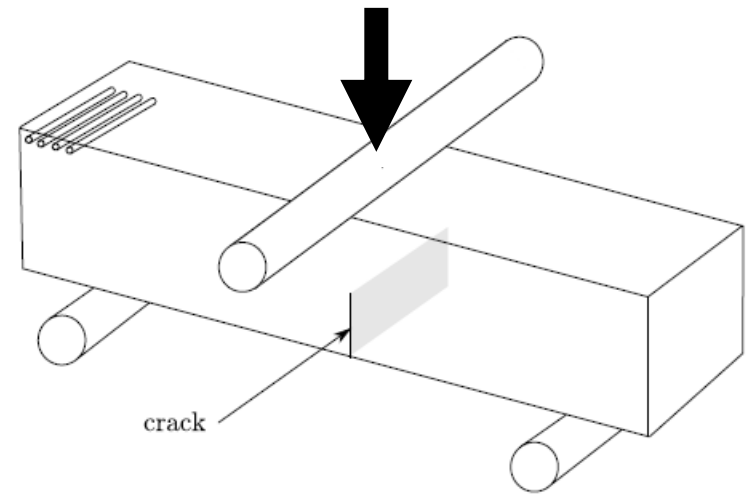
Objective of the work:

To evaluate and compare the fracture toughness of Longitudinal intralaminar cracks and Through-thickness (transverse) intralaminar cracks on composite specimens using the Three Point Bending test

Motivation



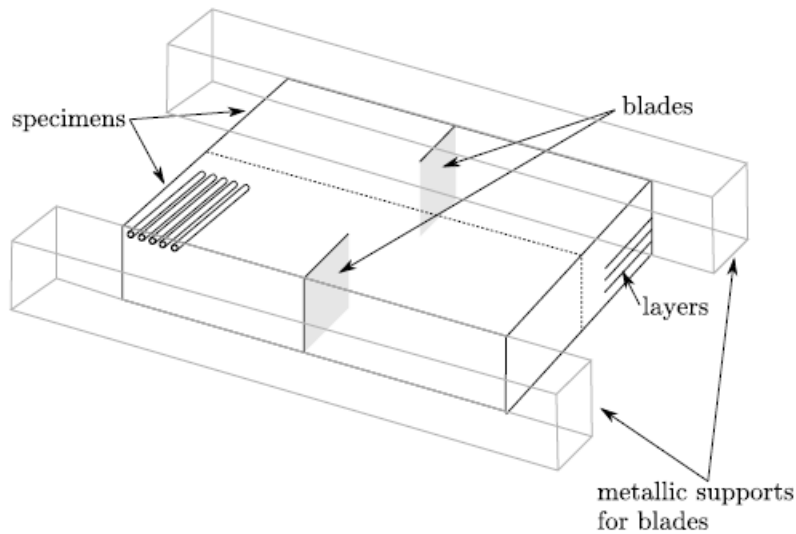
Scheme of a coupon with a crack growing parallel to the fiber direction (Longitudinal)



Scheme of a coupon with a crack growing perpendicular to the fiber direction (Transversal)

Specimens fabrication

Laminate for a crack growing parallel to the fiber direction (Longitudinal)

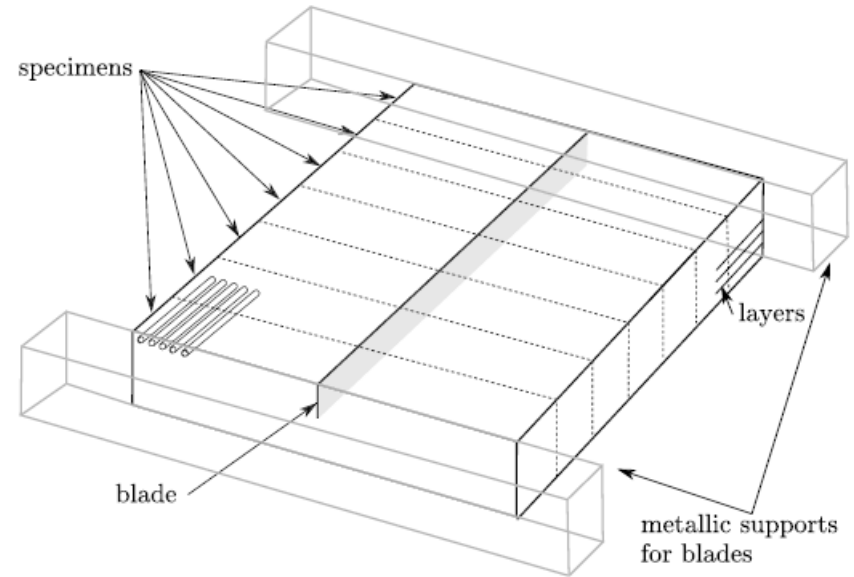


Number of layers: 53

2 coupons

Material: AS4/8552

Laminate for a crack growing perpendicular to the fiber direction (Transversal)



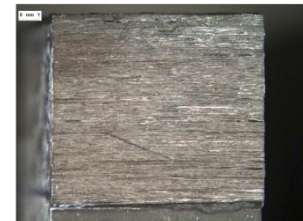
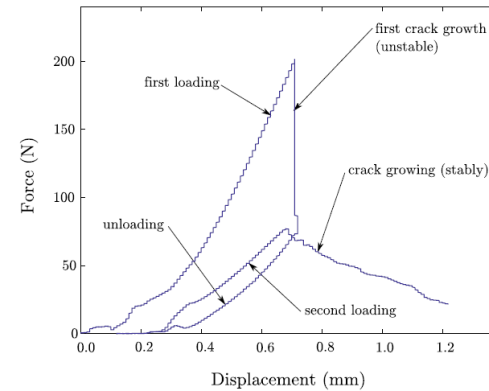
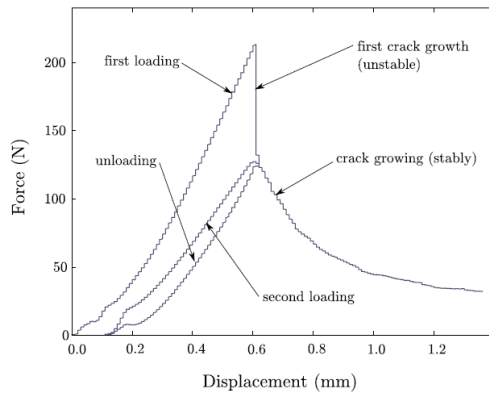
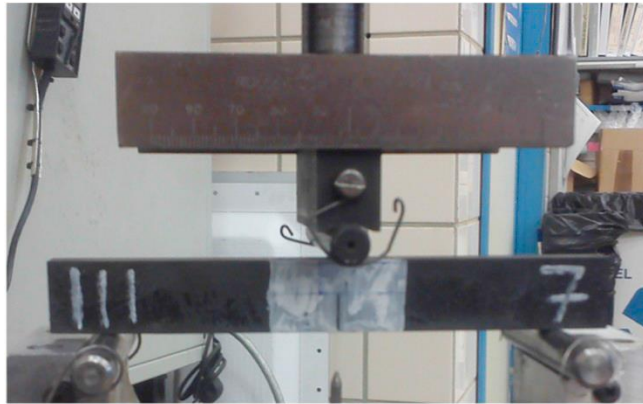
Number of layers: 100

8 coupons

Specimens fabrication

Test of a specimen with a crack growing parallel to the fiber direction (Longitudinal)

Test of a specimen with a crack growing perpendicular to the fiber direction (Transversal)



Type	Mean G_c (J/m ²)	STD (J/m ²)	CV(%)
Long. TPB	561.99	36.55	6.50
Trans. TPB	408.53	16.07	3.93

Experimental campaign

Summary

A test campaign to evaluate the fracture toughness on a composite material when the crack propagates intralaminar parallel and perpendicular to the fibres has been carried out.

Three point bending tests have been performed.

The fracture toughness when the crack propagates along the direction of the fibres has been found to be a 37% higher than when the crack propagates perpendicular to the fibres.

One potential explanation: Whereas for longitudinal intralaminar crack propagation specimens the crack has to follow the path prescribed by the fibers in order to avoid breaking fibers, for transverse intralaminar crack propagation the crack is relatively free to grow following the most favorable crack path according to the stress distribution.

**Thanks for
your attention**